

CLAIMS:

1. A catheter assembly comprising:
 - a catheter, the catheter having a length that extends distally from a proximal end, the catheter comprising an inner shaft and an outer shaft, and at least one heat transmitting mechanism,
 - at least one portion of at least one of the inner shaft and the outer shaft of the catheter having a predetermined longitudinal stiffness, the at least one portion having a predetermined temperature, the predetermined longitudinal stiffness being changed when the predetermined temperature is changed.
2. The assembly of claim 1 wherein the at least one heat transmitting mechanism extends distally from the proximal end along the length of the catheter to a position adjacent to the at least one portion, at least a portion of the at least one heat transmitting mechanism constructed and arranged to conductively change the predetermined temperature of the at least one portion.
3. The assembly of claim 1 wherein the at least one heat transmitting mechanism comprises at least one fluid transmission lumen, the at least one fluid transmission lumen constructed and arranged to transport a fluid having a temperature different than the predetermined temperature of the at least one portion from the proximal end of the catheter to the position adjacent to the at least one portion.
4. The assembly of claim 3 wherein the fluid has a temperature greater than that of the predetermined temperature of the at least one portion.
5. The assembly of claim 4 wherein the at least one heat transmitting mechanism is constructed and arranged to conductively transmit heat from the fluid to the at least one portion.
6. The assembly of claim 3 wherein the fluid has a temperature less than that of the predetermined temperature of the at least one portion.
7. The assembly of claim 6 wherein the at least one heat transmitting mechanism is constructed and arranged to conductively transmit heat from the at least one portion to the fluid.
8. The assembly of claim 3 further comprising a fluid source in fluid communication with the at least one fluid transmission lumen.

9. The assembly of claim 3 wherein the at least one fluid transmission lumen is defined by a lumen wall of at least one material selected from the group consisting of polyamide, copolymer polyolefin, polyethelyne, and any combination thereof.
10. The assembly of claim 3 wherein the at least one fluid transmission lumen is defined by a lumen wall having a thickness of about 0.002 inches or less.
11. The assembly of claim 3 wherein the at least one fluid transmission lumen is defined by a lumen wall having a thickness of about 0.001 inches or less.
12. The assembly of claim 3 wherein the at least one fluid transmission lumen has a diameter of about 0.002 inches to about 0.008 inches.
- 10 13. The assembly of claim 3 wherein the at least one fluid transmission lumen has a diameter of about 0.003 inches.
14. The assembly of claim 9 wherein the lumen wall is at least partially contained within the inner shaft.
- 15 15. The assembly of claim 9 wherein the lumen wall is immediately adjacent to the inner shaft.
16. The assembly of claim 9 wherein the lumen wall is immediately adjacent to the outer shaft.
17. The assembly of claim 3 wherein the fluid is a liquid.
18. The assembly of claim 1 wherein the at least one portion of at least one of the inner shaft and the outer shaft of the catheter is at least partially constructed from polyethylene (LDPE), high density polyethylene (HDPE), ionomer and a polyether block amide, one or more liquid crystal polymers, one or more ionomers, polytetrafluoroethylene (PTFE), and any combination thereof.
- 20 19. The assembly of claim 1 wherein the inner shaft is constructed of at least three layers.
- 25 20. The assembly of claim 19 wherein the at least three layers comprise:
a first layer, the first layer defining a guide wire lumen, the first layer being at least partially constructed from HDPE.
21. The assembly of claim 20 wherein the at least three layers further comprise:
30 a second layer of anhydride modified linear low density polyethylene, the first layer being engaged to the second layer.

22. The assembly of claim 21 wherein the at least three layers further comprise:
a third layer, the third layer is at least partially constructed of at least one third layer material exhibiting an order/disorder transformation during a change in the temperature of the at least one third layer.
- 5 23. The assembly of claim 22 wherein the at least on third layer material is selected from at least one member of the group consisting of polyether block amide, LCP, copolymer polyolefin, and any combination thereof.
24. The assembly of claim 1 further comprising a balloon, the balloon being engaged to at least a portion of at least one of the inner shaft and outer shaft.
- 10 25. The assembly of claim 24 wherein at least a portion of the balloon defines a stent mounting region.
26. The assembly of claim 1 wherein the at least one heat transmitting mechanism comprises at least one electrically conductive member and at least one at least one heating element positioned adjacent to the at least one portion.
- 15 27. The assembly of claim 26 wherein the at least one electrically conductive member extending from the at least one heating element to a source of electrical current positioned adjacent to the proximal end of the catheter, the at least one electrically conductive member in selective electronically conductive communication with the source of electric current and the at least one heating element.
- 20 28. The assembly of claim 27 wherein when an electric current is communicated to the at least one heating element, the at least one heating element produces heat.
29. The assembly of claim 28 wherein the at least one heat transmitting mechanism is constructed and arranged to conductively transmit heat from the at least one heating element to the at least one portion.
- 25 30. The assembly of claim 29 wherein the at least one heat transmitting mechanism further comprises at least one fluid transmission lumen, the at least one fluid transmission lumen constructed and arranged to transport a fluid having a temperature different than the predetermined temperature of the at least one portion from the proximal end of the catheter to the position adjacent to the at least one portion.
- 30 31. The assembly of claim 30 wherein the fluid has a temperature less than that of the predetermined temperature of the at least one portion.

32. The assembly of claim 31 wherein the at least one fluid transmission lumen conductively transmits heat from the at least one portion to the fluid.
33. The assembly of claim 3 wherein the temperature of the fluid is at least about 10 degrees Celsius warmer than human body temperature.
- 5 34. The assembly of claim 3 wherein the temperature of the fluid is at least about 10 degrees Celsius cooler than human body temperature.
35. The assembly of claim 3 wherein the temperature of the fluid is at least about 25 degrees Celsius cooler than human body temperature.
36. The assembly of claim 3 wherein the temperature of the fluid is about 50 degrees
10 Celsius to about 60 degrees Celsius.
37. The assembly of claim 3 wherein the temperature of the fluid is about 15 degrees Celsius to about – 195 degrees Celsius.
38. The assembly of claim 3 wherein the fluid is at least partially comprised of Nitrous Oxide.